

Claims

5 1. A pod latchdown mechanism for latching a control pod to a subsea oilfield structure having control lines extending to a coupler component supported on a receptacle plate on the subsea oilfield structure for cooperation with a coupler component supported on a lower mounting plate on the control pod, the latchdown mechanism comprising:

10 a subsea receptacle housing secured to the subsea structure for receiving the control pod therein and having a latching surface at an upper end of the receptacle housing;

15 a latchdown actuator movably supported on the control pod; and

20 a plurality of gripping arms for engagement and disengagement with the latching surface to selectively connect and disconnect the control pod from the oilfield structure in response to movement of the latchdown actuator.

25 2. A latchdown mechanism as defined in Claim 1, further comprising:

30 the latching surface on the receptacle housing includes at least one recess in an inner surface of the receptacle housing for receiving the plurality of gripping arms.

35 3. A latchdown mechanism as defined in Claim 1, wherein the latchdown actuator is movable along a central axis substantially coaxially with a control pod central axis.

40 4. A latchdown mechanism as defined in Claim 1, wherein the latchdown actuator comprises a collar movable between an unlatched position and a latched position and pivotally connected to the plurality of gripping arms, thereby moving the plurality of gripping arms into and out of engagement with the latching surface on the receptacle housing.

5. A latchdown actuator as defined in Claim 4, further comprising:
a hydraulically powered running tool for moving the collar between the latched
and unlatched positions.
- 5 6. A latchdown mechanism as defined in Claim 4, further comprising:
an upwardly extending sleeve secured to the control pod for guiding
movement of a collar.
- 10 7. The latchdown mechanism as defined in Claim 6, wherein each of the
gripping arms lies with the plane substantially perpendicular to a central axis of the
control pod when in the latched position.
- 15 8. A latchdown mechanism as defined in Claim 6, further comprising:
a ring carrier assembly radially outward of the sleeve and including a split ring
for securing the plurality of gripping arms in engagement with the latching surface on
the receptacle housing.
- 20 9. A latchdown mechanism as defined in Claim 8, further comprising:
the sleeve includes an internal sleeve groove; and
the split ring is received within the sleeve groove when the gripping arms are
in engagement with the latching surface.
- 25 10. A latchdown mechanism as defined in Claim 8, further comprising:
a shear member for interconnecting the ring carrier assembly with the collar,
such that the shear member may shear to release the collar from the ring carrier
assembly to move the plurality of gripping arms out of engagement with the latching
surface.
- 30 11. A latchdown mechanism as defined in Claim 1, further comprising:
one of the control pod and the receptacle housing being provided with an
axially extending slot having a radial thickness sized to receive a protrusion on the

other of the control pod and the receptacle housing for rotationally aligning the control pod with respect to the receptacle housing prior to activating the latching mechanism.

5 12. A latching mechanism as defined in Claim 1, further comprising:
a locking mandrel on a running tool axially movable with respect to a running tool head from an unlocked position to a locked position, such that the running tool head is selectively secured to the control pod;

10 a sleeve secured to the pod and having a central bore for receiving the running tool head; and

one or more locking members radially movable with respect to the running tool head in response to axial movement of the locking mandrel to lock the running tool head to the sleeve.

15 13. A latching mechanism as defined in Claim 12, further comprising:
a crank mechanism for controlling axial movement of the locking mandrel with respect to the running tool head.

20 14. A latching mechanism as defined in Claim 12, wherein the locking mandrel is a hydraulically powered piston movable from an unlocked position to a locked position.

25 15. A pod latching mechanism for latching a control pod and related control lines to a subsea oilfield structure, the latching mechanism comprising:

a subsea receptacle housing secured to the subsea structure and having a latching surface including at least one recess in an inner surface of the receptacle housing;

30 a collar movable between an unlatched position and a latched position, thereby moving a plurality of gripping arms into and out of engagement with the latching surface of the receptacle housing; and

the plurality of gripping arms are positioned along a periphery of the control pod for engagement and disengagement with the latching surface to selectively connect and disconnect the control pod from the oilfield structure in response to movement of the collar.

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16. A latchdown mechanism is defined in Claim 15, further comprising:
one of the control pod and the receptacle housing being provided with an axially extending slot having a radial thickness sized to receive a protrusion on the other of the control pod and the receptacle housing for rotationally aligning the control pod with respect to the receptacle housing prior to activating the latchdown mechanism.

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17. A latchdown mechanism as defined in Claim 15, further comprising:
an upwardly extending sleeve secured to the control pod for guiding movement of the collar; and

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each of the plurality of gripping arms are pivotally mounted to the collar and to the control pod at a position radially outward of the collar.

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18. A pod latchdown mechanism for latching a control pod to a subsea oilfield structure, the latchdown mechanism comprising:

a subsea receptacle housing secured to the subsea structure for receiving the control pod therein;

a latchdown actuator movably supported on the control pod; and

25 a plurality of gripping arms positioned along a periphery of the control pod for selective engagement and disengagement with the receptacle housing, the plurality of gripping arms being pivotally connected to the control pod such that movement of the latchdown actuator to an unlatched position produces a decoupling force between the control pod and the subsea structure greater than an unlatching force of the latchdown actuator.

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19. A latchdown mechanism as defined in Claim 18, further comprising:

the subsea receptacle housing has a cavity therein to receive the control pod extending axially over substantially the entire length of the control pod, the receptacle housing including an inner profile to latch the control pod to the subsea structure in response to movement of the latching actuator with respect to the control pod.

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20. A latching mechanism as defined in Claim 18, further comprising:
one of the control pod and the receptacle housing being provided with an
axially extending slot having a radial thickness sized to receive a protrusion on the
other of the control pod and the receptacle housing for rotationally aligning the
control pod with respect to the receptacle housing prior to activating the latching
mechanism.

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21. A pod latching mechanism for latching a control pod with a control
pod central axis to a subsea oilfield structure having control lines extending through a
receptacle plate on the subsea oilfield structure for cooperation with control lines
extending through a lower mounting plate on the control pod, the latching
mechanism comprising:

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a subsea receptacle housing secured to the subsea structure for receiving the
control pod therein and having an interior latching surface at an upper end of the
receptacle housing;

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a latching actuator supported on the control pod;
a plurality of gripping arms positioned along a periphery of the control pod for
engagement and disengagement with the latching surface to selectively connect and
disconnect the control pod from the oilfield structure in response to the latching
actuator; and

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one of the control pod and the receptacle housing being provided with an
axially extending slot having a radial thickness sized to receive a protrusion on the
other of the control pod and the receptacle housing for rotationally aligning the
control pod with respect to the receptacle housing prior to activating the latching
mechanism.

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22. A latchdown mechanism as defined in Claim 21, further comprising:
the latching surface on the receptacle housing includes at least one recess in
an inner surface of the receptacle housing for receiving the plurality of gripping arms.

5 23. A latchdown mechanism as defined in Claim 21, wherein the latchdown
actuator comprises a collar movable between an unlatched position and a latched
position, thereby moving the plurality of gripping arms into and out of engagement
with the latching surface on the receptacle housing.

10 24. A latchdown mechanism as defined in Claim 21, further comprising:
an upwardly extending sleeve secured to the control pod for guiding
movement of a collar; and
each of the plurality of gripping arms are pivotally mounted to the collar and to
the control pod at a position radially outward of the collar.

15 25. A latchdown mechanism as defined in Claim 1, further comprising:
a locking mandrel axially movable with respect to a tool head from an
unlocked position to a locked position, such that the tool head is selectively secured
to the control pod;

20 a sleeve secured to the pod and having a central bore for receiving the tool
head; and
one or more locking members radially movable with respect to the tool head in
response to axial movement of the locking mandrel to lock the tool head to the
sleeve.

25 26. A latchdown mechanism as defined in Claim 21, wherein the plurality of
gripping arms are pivotally connected to the control pod such that movement of the
latchdown actuator to an unlatched position produces a decoupling force between
the control pod and the subsea structure greater than an unlatching force of the
30 latchdown actuator.